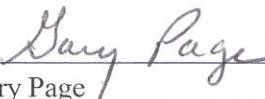


CRITERION 406

CROSS-CONNECTION CONTROL

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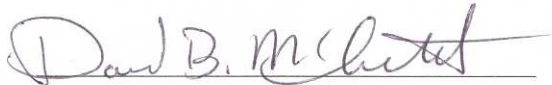
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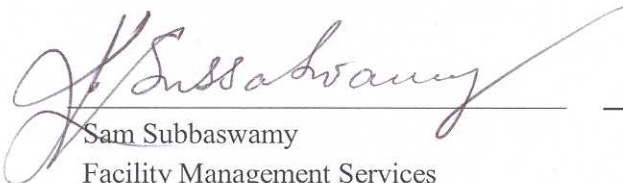
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RECORD OF REVISIONS

Revision No.	Date	Description
0	08/27/98	Initial Issue.
1	09/06/01	Includes the addition of a Table of Contents, the use of Basis Statements in Section 6 and 7; further clarification based on the new criterion 101 Writer's Guide as well as the incorporation of ORPS & NRC lessons learned from 1/1/95 to 2/1/2000. This revision reflects the conversion from a WordPerfect document into a Microsoft Word document.

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CRITERION 406

CROSS-CONNECTION CONTROL

1.0 PURPOSE

The purpose of this Criterion is to establish the minimum requirements and best practices for the operation and maintenance of backflow prevention assemblies and cross-connection control. This document addresses the requirements of LIR 230-05-01, (Ref. 10.1) “Operations and Maintenance Manual.”

The implementation of these requirements and recommendations satisfies DOE Order 430.1A, “Life Cycle Asset Management;” Attachment 2, “Contractor Requirements Document” Paragraph 2, Sections A through C, which in part requires UC to “...maintain physical assets in a condition suitable for their intended purpose” and employ “preventive, predictive, and corrective maintenance to ensure physical asset availability for planned use and/or proper disposition.” Compliance with DOE Order 430.1A is required by Appendix G of the UC Contract.

Cross-connection control and backflow prevention are mandatory requirements under the New Mexico Drinking Water Regulations – 20NMAC7.1, Section 208. (Ref. 10.7)

These regulations are designed to:

- Protect the potable water supply of LANL from the possibility of contamination or pollution by isolating within LANLs internal distribution system(s) such contaminants or pollutants that could backflow, due to back pressure or back siphonage, into the potable water system.
- Promote the elimination or control of existing cross connections, actual or potential, between LANLs in-plant potable water system(s), non-potable water systems, and plumbing fixtures.

2.0 SCOPE

The scope of this Criterion shall apply to the erection, installation, alteration, repair, relocation, replacement, addition to, and use or maintenance of plumbing systems of LANL facilities where potable or non-potable water systems are involved and are subject to compromise through cross connection. This Criterion does not address corrective maintenance actions to repair or replace equipment.

3.0 ACRONYMS AND DEFINITIONS

3.1 Acronyms

AR	Administrative Requirements
AWWA	American Water Works Association
CFR	Code of Federal Regulations
DOE	Department of Energy
LIR	Laboratory Implementing Requirement
LIG	Laboratory Implementing Guidance
LPR	Laboratory Performance Requirement
O&M	Operations and Maintenance
PPE	Personal Protection Equipment
PP&PE	Personal Property and Programmatic Equipment
RP&IE	Real Property and Installed Equipment
SSC	Structures, Systems, and Components
SSS	Support Services Subcontractor for LANL
UC	University of California
UPC	Uniform Plumbing Code
USC/FCCC&HR	University of Southern California/Foundation for Cross-Connection Control and Hydraulic Research

3.2 Definitions

Back Pressure. Backflow due to an elevation of pressure in the downstream piping system (by pump, elevation of piping, or steam and/or air pressure) above the supply pressure at the point of consideration which would cause, or tend to cause, a reversal of the normal direction of flow.

Back-Siphonage. A form of backflow due to a reduction in system pressure which causes a subatmospheric pressure to exist at a site in the water system.

Backflow Prevention Assembly. Any effective assembly used to prevent backflow into a potable water system.

Contaminant. Any substance that could, if introduced into the potable water supply, cause death, illness, spread disease, or have a high probability of causing such effects. Also defined as “high hazard.”

Cross Connection. Any unprotected actual or potential connection between a potable water system used to supply water for drinking purposes and any source or system containing unapproved water or a substance that is not or cannot be approved as safe, wholesome and potable. Bypass arrangements, jumper connections, removable sections, swivel or changeover devices, or other devices through which backflow could occur, shall be considered to be cross connections.

Pollutant. Any substance that generally would not be a health hazard, but would constitute a nuisance, or be aesthetically objectionable, if introduced into the potable water supply. Also defined as “low hazard.”

Potable Water. Water, which is satisfactory for drinking, culinary, and domestic purpose and meets the federal and state regulatory requirements.

4.0 RESPONSIBILITIES

4.1 FWO-Systems, Engineering and Maintenance (SEM)

4.1.1 FWO-SEM is responsible for the technical content of this Criterion and assessing the proper implementation across the Laboratory.

4.1.2 FWO-SEM shall provide technical assistance to support implementation of this Criterion.

4.2 Facility Manager

4.2.1 Responsible for operations and maintenance of institutional, or Real Property and Installed Equipment (RP&IE) under their jurisdiction, in accordance with the requirements of this document.

4.2.2 Responsible for operations and maintenance of those Personal Property and Programmatic Equipment (PP&PE) systems and equipment addressed by this document that may be assigned to the FM in accordance with the FMU-specific Facility/Tenant Agreement.

4.3 Group Leader

4.3.1 Responsible for implementing operational and maintenance surveillance programs including the preparation and maintenance of required procedures and documentation for PP&PE under their jurisdiction that is covered by this Criterion.

5.0 PRECAUTIONS AND LIMITATIONS

5.1 Precautions

This section is not intended to identify all applicable precautions necessary for implementation of this Criterion. A compilation of all applicable precautions shall be contained in the implementing procedure(s) or work control authorization documents. The following precautions are intended only to assist the author of a procedure or work control document in the identification of hazards/precautions that may not be immediately obvious.

5.2 Limitations

The intent of this Criterion is to identify the minimum generic requirements and recommendations for SSC operation and maintenance across the Laboratory. Each user is responsible for the identification and implementation of additional facility specific requirements and recommendations based on their authorization basis and unique equipment and conditions, (e.g., equipment history, manufacturer warranties, operating environment, vendor O&M requirements and guidance, etc.). Nuclear facilities and moderate to high hazard non-nuclear facilities will typically have additional facility-specific requirements beyond those presented in this Criterion. Nuclear facilities shall implement the requirements of DOE Order 4330.4B (Ref. 10.3) (or 10 CFR 830.340, Maintenance Management, when issued) as the minimum programmatic requirements for a maintenance program. Additional requirements and recommendations for SSC operation and maintenance may be necessary to fully comply with the current DOE Order or CFR identified above.

6.0 REQUIREMENTS

Minimum requirements that Criterion users shall follow are specified in this section. Requested variances to these requirements shall be prepared and submitted to FWO-SEM in accordance with LIR 301-00-02 (Ref. 10.4), "Variances and Exceptions to Laboratory Operations Requirements," for review and approval. The Criterion users are responsible for analysis of operational performance and SSC replacement or refurbishment based on this analysis. Laws, codes, contractual requirements, engineering judgement, safety matters, and operations and maintenance experience drive the requirements contained in this section.

6.1 Operations Requirements

- 6.1.1** Ensure that there is no piping arrangement or connection by which an unsafe substance may enter the drinking water supply.

Basis: LIR 220-03-01, LANL Facility Engineering Manual, Chapter 6 – Mechanical, Section 201.3, which invokes the Uniform Plumbing Code (IAPMO). (Ref. 10.11) UPC required under Appendix G of the UC/DOE Contract.

6.2 Maintenance Requirements

- 6.2.1** The installation and replacement of the backflow prevention assembly shall comply with the requirements of the UPC.

- A. The backflow prevention assembly shall be tested/repared by a certified backflow assembly tester at the time of installation, repair or relocation and at least on an annual schedule thereafter or more frequently as defined in the facility authorization basis.
- B. New or repaired backflow prevention assemblies on potable water systems shall be disinfected prior to use and shall comply with the requirements of the UPC.

Basis: LIR 220-03-01, LANL Facility Engineering Manual, Chapter 6 – Mechanical, Section 201.3, which invokes the Uniform Plumbing Code (IAPMO). (Ref. 10.11) UPC required under Appendix G of the UC/DOE Contract.

7.0 RECOMMENDATIONS AND GOOD PRACTICES

The information provided in this section is recommended based on acceptable industry practices and should be implemented by each user based on his/her unique application and operating history of the subject systems/equipment.

7.1 Operations Recommendations

- 7.1.1** The AWWA Manual M14 “Recommended Practice for Backflow Prevention and Cross-Connection Control,” (Ref. 10.6); the “Uniform Plumbing Code,” and the USC “Manual of Cross-Connection Control” (USC/FCCC&HR) (Ref. 10.10) may be used as guides.

7.2 Maintenance Recommendations

- 7.2.1** Provided it has been reviewed and approved by FWO-SEM, SSS Craftsperson should comply with the “PMI 40-40-002, Backflow Preventer Maintenance Repair.” procedure. (Ref. 10.8)

8.0 GUIDANCE

8.1 Operations Guidance

- 8.1.1** No implementing guidance available.

8.2 Maintenance Guidance

- 8.2.1** No implementing guidance available.

9.0 REQUIRED DOCUMENTATION

Maintenance history shall be maintained for the cross-connection program to include, as a minimum, the parameters listed in the Table 9-1 below:

Table 9-1 Documentation Parameters

MAINTENANCE HISTORY DOCUMENTATION PARAMETERS				
PARAMETER	ML 1	ML 2	ML 3	ML 4
Maintenance Activities				
Backflow Preventer Assembly Repair/Adjustments	X	X	X	X
PM: Backflow Preventer Assembly testing	X	X	X	X
Installation Assemblies	X	X	X	X
Equipment Problems				
Failure Dates	X	X	X	X
Failure Root Cause	X	X		
Inspection Results				
Survey/Inspection Date	X	X	X	X
Master Equipment List	X	X	X	X

Basis: Documentation of the parameters listed in Table 9-1 above satisfies the requirements of LPR 230-07-00, Criteria 2, (Ref. 10.5) which states;

“Maintenance activities, equipment problems, and inspection and test results are documented.”

10.0 REFERENCES

The following references, and associated revisions, were used in the development of this document.

- 10.1** LIR 230-05-01.0, Operation and Maintenance Manual.
- 10.2** DOE O 430.1A, Attachment 2 “Contractor Requirements Document” (Paragraph 2, Sections A through C), a requirement of Appendix G of the UC Contract.
- 10.3** DOE Order 4330.4B, Maintenance Management Program, Section 3.4.9.
- 10.4** LIR 301-00-02.0, Variances and Exceptions to Laboratory Operation Requirements.
- 10.5** LPR 230-07-00, Maintenance History, Performance Criteria [2].
- 10.6** AWWA Manual M14, Recommended Practice for Backflow Prevention and Cross-Connection Control, 1990.
- 10.7** New Mexico Drinking Water Regulations– 20NMAC7.1, Title 20, Chapter 7, Part 1, Section 208, 1995.
- 10.8** SSS Procedure PMI 40-40-002, Backflow Preventer Maintenance and Repair.
- 10.9** Uniform Plumbing Code (UPC), 1997.
- 10.10** USC/FCCC&HR Manual of Cross-Connection Control, Ninth Edition.
- 10.11** LANL Facility Engineering Manual, Chapter 6, Section 200, 1999.

11.0 APPENDICES

None.